
ABSTRACT

A photo-electrolytic catalyst system which comprises two materials: (a) a semiconductor material with a non-zero energy gap E_g which, in response to an incident radiation having an energy greater than E_g , generates electron-hole pairs as charge carriers; and (b) a facilitating material in electronic contact with the semiconductor material to facilitate separation of the radiation-generated electrons from the holes to reduce the probability of charge carrier recombinations. The catalyst makes use of both majority and minority charge carriers to promote photo-electrolysis reactions for producing hydrogen directly from water or an aqueous electrolyte at higher rates and improved efficiencies.